

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (original) A method for the preparation of a cross-linked proton exchange membrane, comprising:

providing a sulfonated polymer having a degree of sulfonation higher than 0.6;

dissolving the sulfonated polymer in a polar casting solvent;

adding at least one polyol cross-linking agent to obtain a solution, the at least one polyol cross-linking agent being added in a ration of polyol molecules per repeat unit of the sulfonated polymer higher than or equal to 1 to generate cross-linking;

casting the solution to obtain the membrane; and

curing the membrane.

2. (original) The method of claim 1, wherein the degree of sulfonation of the sulfonated polymer is higher than 0.75.

3. (currently amended) ~~A method as claimed in any one of claims 1 and 2. The method of claim 1,~~ wherein the ratio of polyol molecules per repeat unit of the sulfonated polymer is between 2 and 3.

4. (currently amended) ~~A method as claimed in any one of claims 1 to 3. The method of claim 1,~~ wherein the sulfonated polymer is dissolved in the polar casting solvent to a concentration ranging between 5 and 25 wt%.

5. (canceled)
6. (currently amended) ~~A method as claimed in any one of claims 1 to 5~~ The method of claim 1, further comprising agitating the solution prior to casting.
7. (currently amended) ~~A method as claimed in any one of claims 1 to 6~~ The method of claim 1, further comprising outgassing the cast solution.
8. (currently amended) ~~A method as claimed in any one of claims 1 to 7~~ The method of claim 1, further comprising drying the cast solution at room temperature.
9. (currently amended) ~~A method as claimed in any one of claims 1 to 8~~ The method of claim 1, further comprising curing the membrane under vacuum.
10. (currently amended) ~~A method as claimed in any one of claims 1 to 9~~ The method of claim 1, wherein the membrane is cured at gradually increasing temperature.
11. (currently amended) ~~A method as claimed in any one of claims 1 to 10~~ The method of claim 1, wherein the membrane is cured at a temperature ranging between 25 and 180° C.
12. (canceled)
13. (currently amended) ~~A method as claimed in any one of claims 1 to 12~~ The method of claim 1, wherein the sulfonated polymer comprises a sulfonated poly(ether ether ketone).
14. (currently amended) ~~A method as claimed in any one of claims 1 to 13~~ The method of claim 1, wherein the polar casting solvent is selected from the group consisting of

DMAc, NMP, DMF, butyrolactone, water, a mixture of water and acetone, and a mixture of water and alcohol.

15. (canceled)

16. (currently amended) ~~A method as claimed in any one of claims 1 to 15~~ The method of claim 1, wherein the at least one polyol cross-linking agent comprises a diol.

17. (canceled)

18. (currently amended) ~~A method as claimed in any one of claims 1 to 17~~ The method of claim 1, comprising drying the sulfonated polymer prior to adding the at least one cross-linking agent.

19. (currently amended) A fuel cell using a cross-linked proton exchange membrane prepared in accordance with ~~any one of claims 1 to 18~~ claim 1.

20. (original) A proton exchange membrane suitable for fuel cells, comprising: a cross-linked sulfonated polymer provided from a solution which has been cast and cured, the solution including a sulfonated polymer, having a degree of sulfonation higher than 0.6, dissolved in a polar casting solvent and at least one polyol cross-linking agent added to the dissolved sulfonated polymer in a ratio of the cross-linking agent molecules per repeat unit of the sulfonated polymer higher than or equal to 1 to generate cross-linking.

21. (canceled)

22. (currently amended) ~~A proton exchange membrane as claimed in one of claims 20 and 21~~ The proton exchange membrane of claim 20, wherein the ratio of polyol molecules per repeat unit of the sulfonated polymer in the solution is between 2 and 3.

23-30. (canceled)

31. (currently amended) ~~A proton exchange membrane as claimed in any one of claims 20 to 30~~ The proton exchange membrane of claim 20, wherein the sulfonated polymer comprises sulfonated poly(ether ether ketone).

32. (currently amended) ~~A proton exchange membrane as claimed in any one of claims 20 to 31~~ The proton exchange membrane of claim 20, wherein the polar casting solvent is selected from the group consisting of DMAc, NMP, DMF, butyrolactone, water, a mixture of water and acetone, and a mixture of water and alcohol.

33. (canceled)

34. (currently amended) ~~A proton exchange membrane as claimed in any one of claims 20 to 33~~ The proton exchange membrane of claim 20, wherein the at least one polyol cross-linking agent comprises a diol.

35. (canceled)

36. (canceled)